

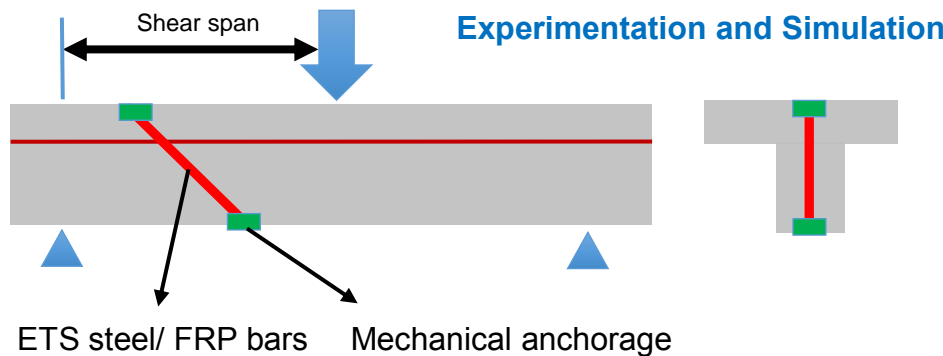
Research title: Mechanical performances of concrete beams with hybrid usage of steel and FRP reinforcement

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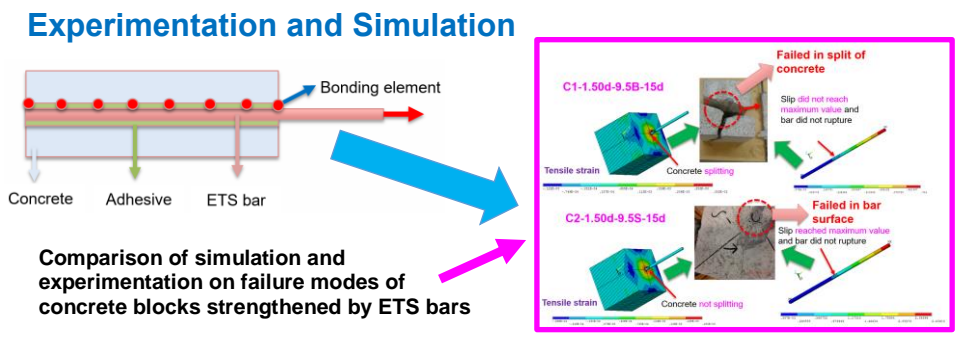
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For the shear strengthening techniques of reinforced concrete beams, the embedded through section (ETS) method overcomes the main disadvantages of the two common techniques, externally bonding (EB) and near surface mounting (NSM); however, there is very few study on this new method. Besides, the high strength and the small weight are the special properties of fiber reinforced polymer (FRP) material that make them attractive as reinforcement for concrete structures. However, due to a linear elastic stress–strain relationship up to failure of FRP; therefore, FRP reinforced concrete elements exhibit brittle failure. The long term goals of the current research are to develop a new shear strengthening method for the reinforced concrete beams as well as to study the structural performances of hybrid FRP-steel reinforced concrete beams. The specific objectives of the study are shown in the following figure.

(i) Shear strengthening of RC beams using ETS method



(ii) Bond behavior between concrete and ETS rods



(iii) Concrete beams reinforced by FRP and steel tension bars

